Spectral Modeling LED Sources

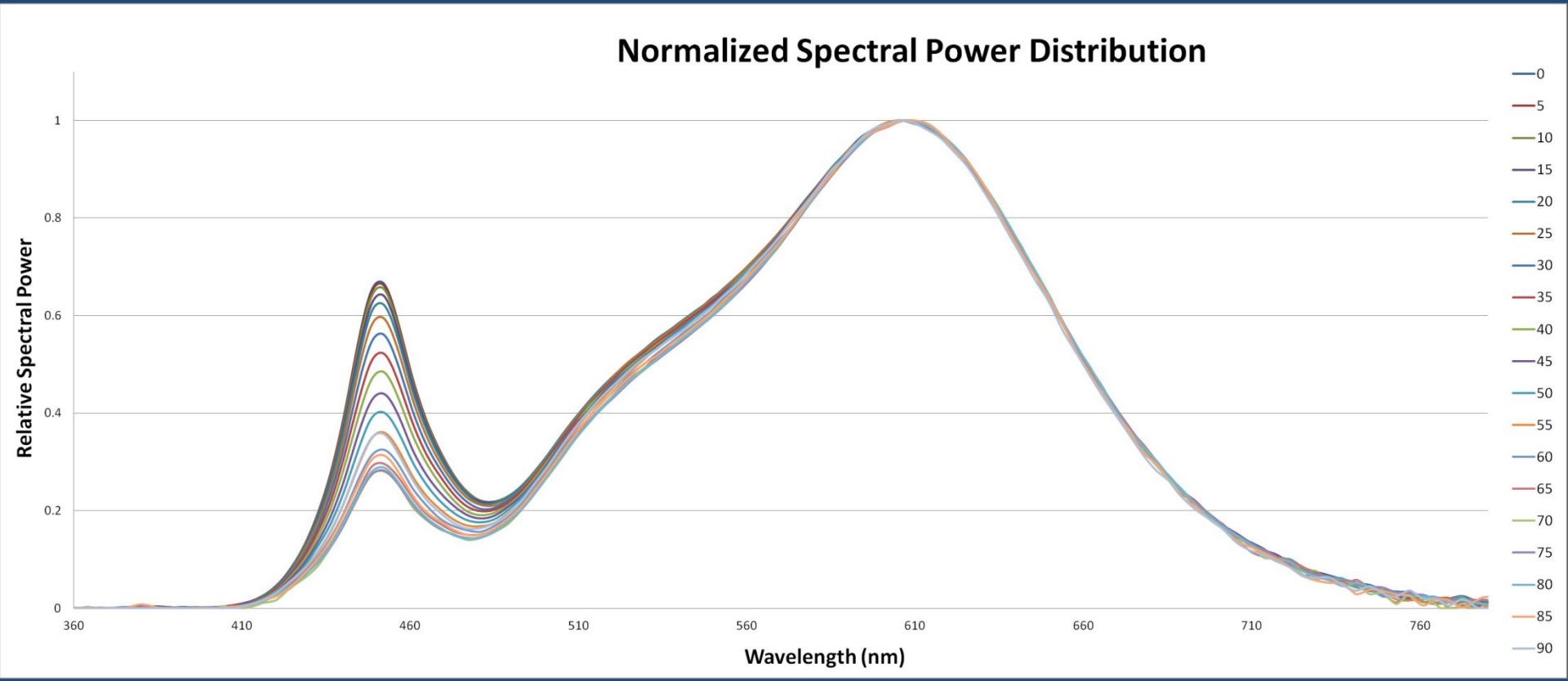
CORM 2015

Presented by Calvin Lanpher

Why is This Important?

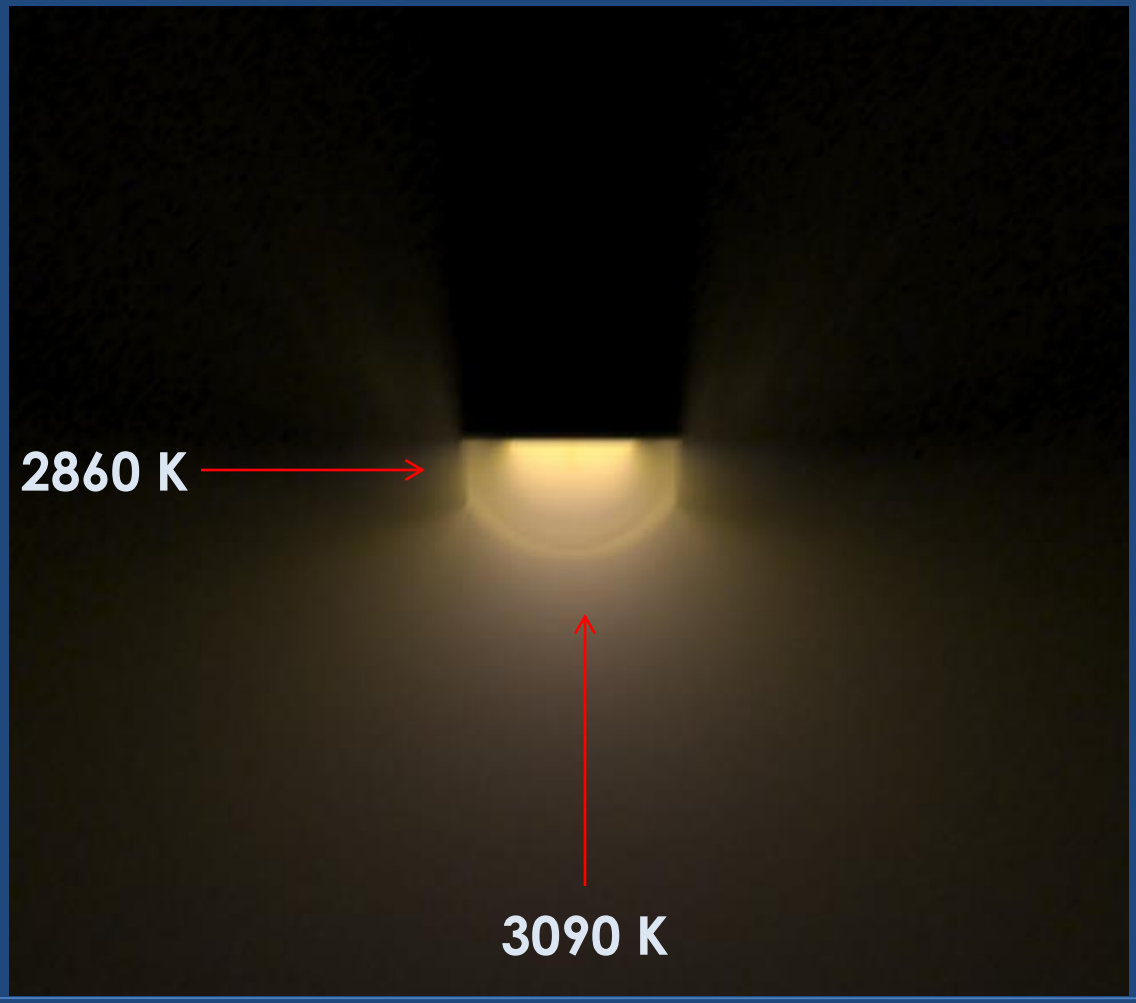
- Performance Prediction
  - Color Simulation
  - Color Metrics
- Perception Prediction
  - Color Rendering

Typical Warm White LED SPDs

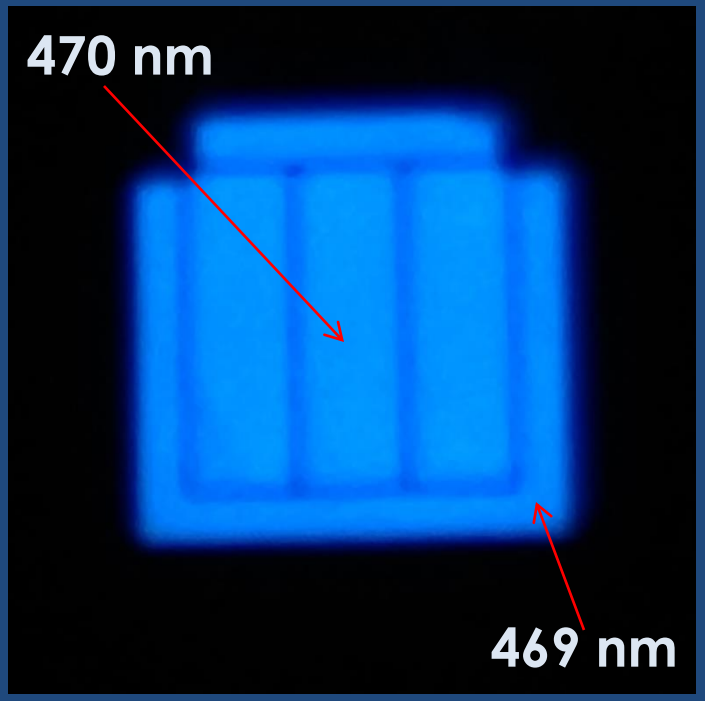


Itioptics

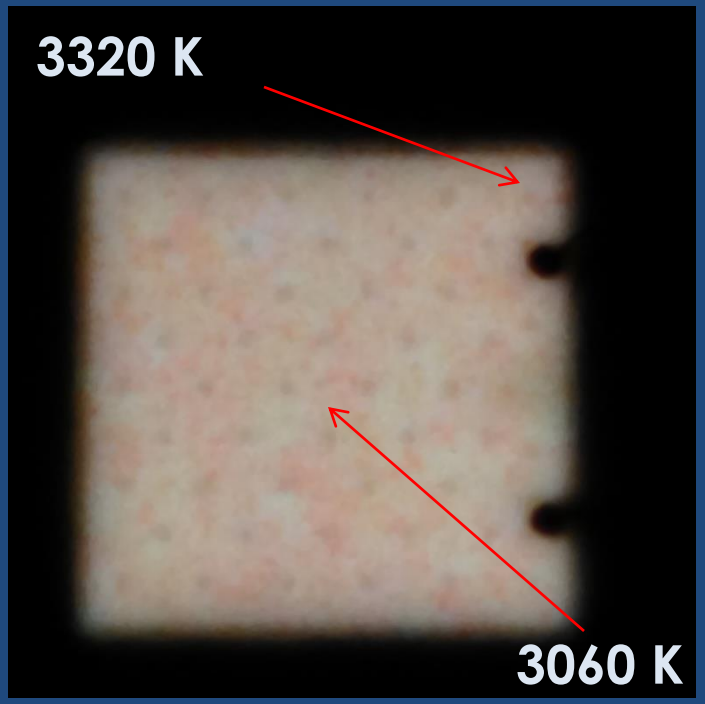
Typical Warm White LED Emission



Typical LED Chip Emission

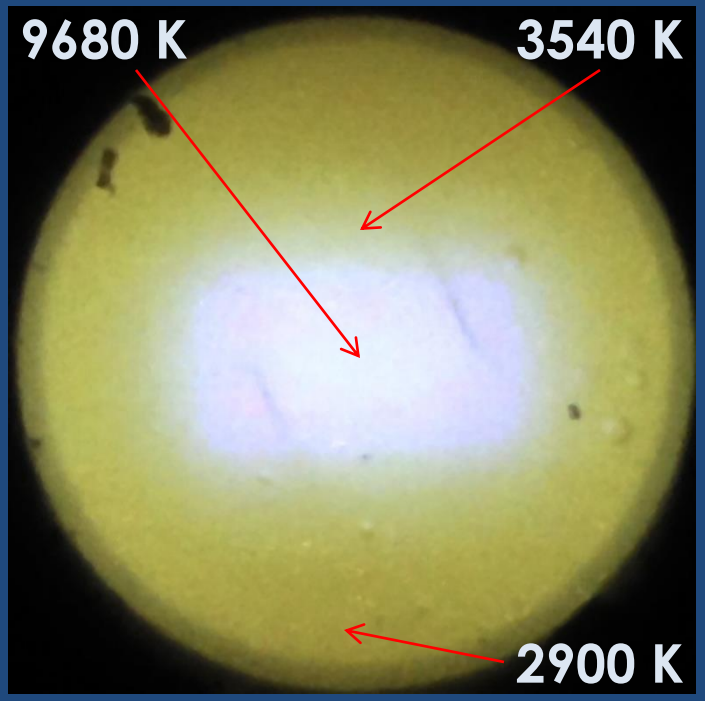


Bare Chip

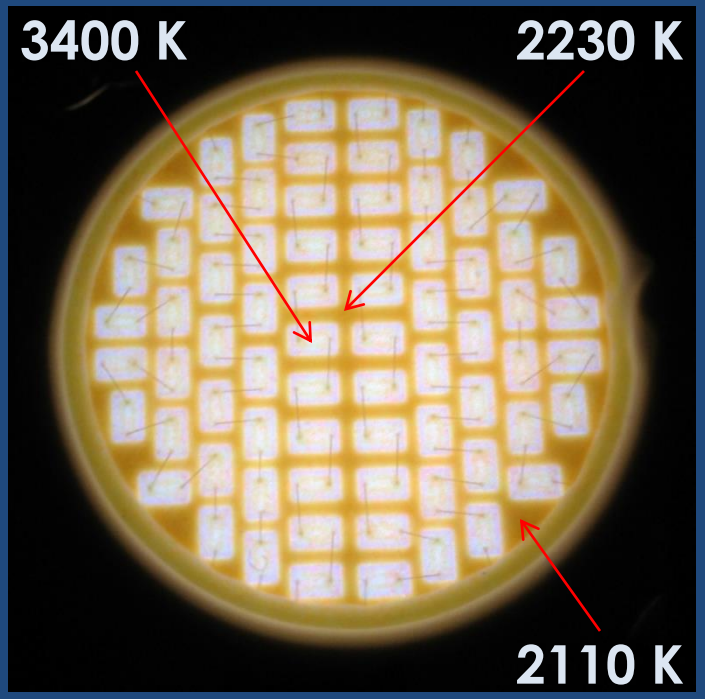


Chip + Phosphor

Typical Chip + Phosphor Emission



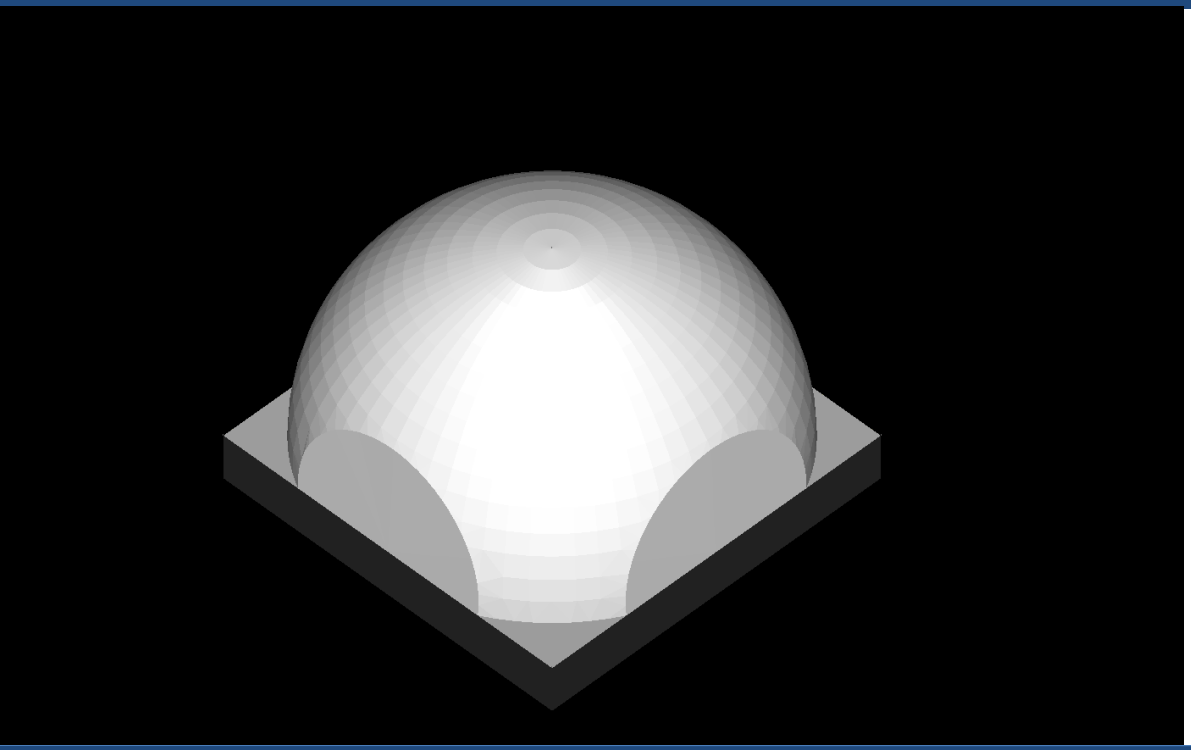
Mid Power

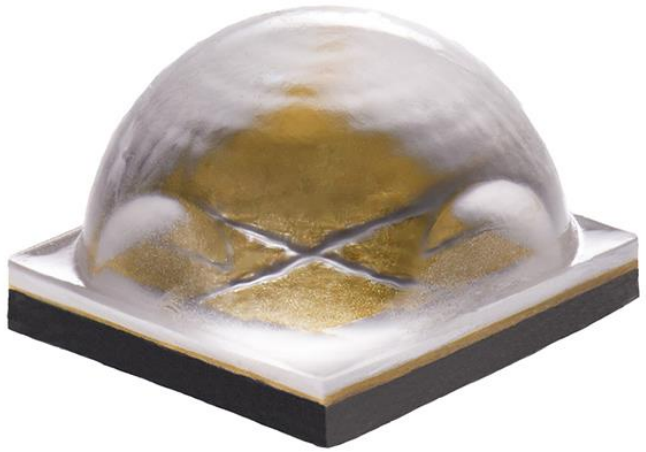


COB

High Power LED

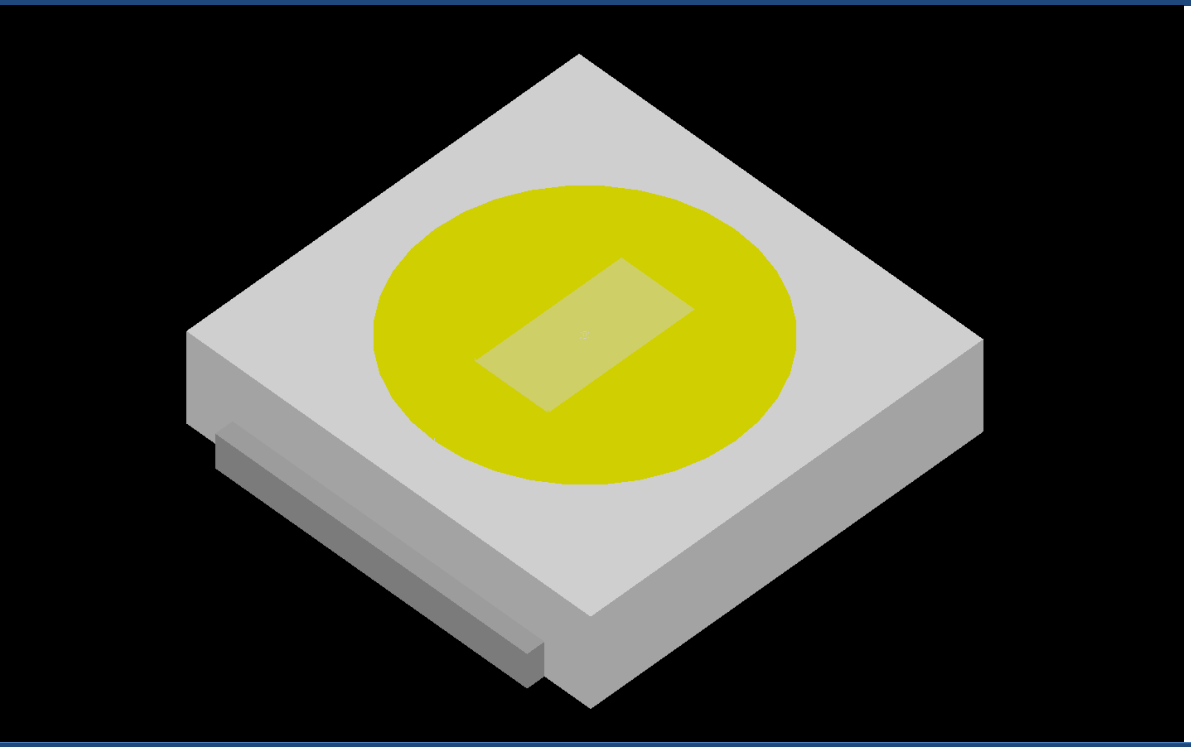
- Cree XHP-50 (3000K)





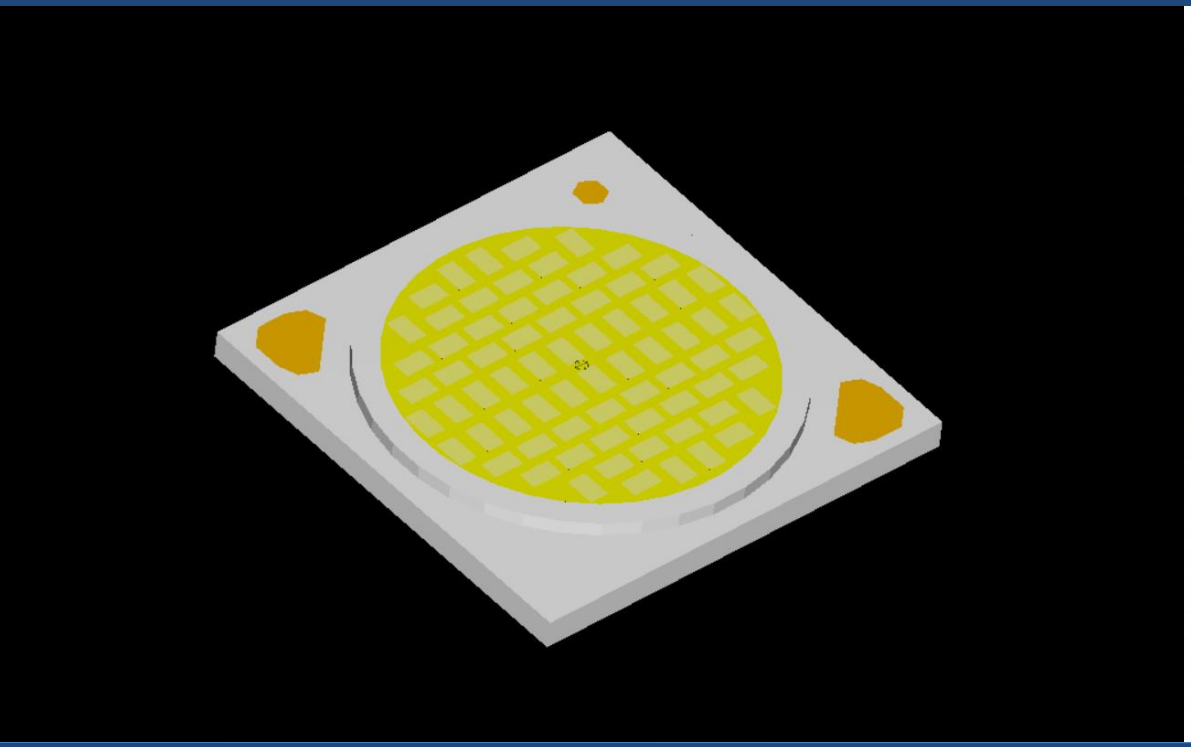
Mid Power LED

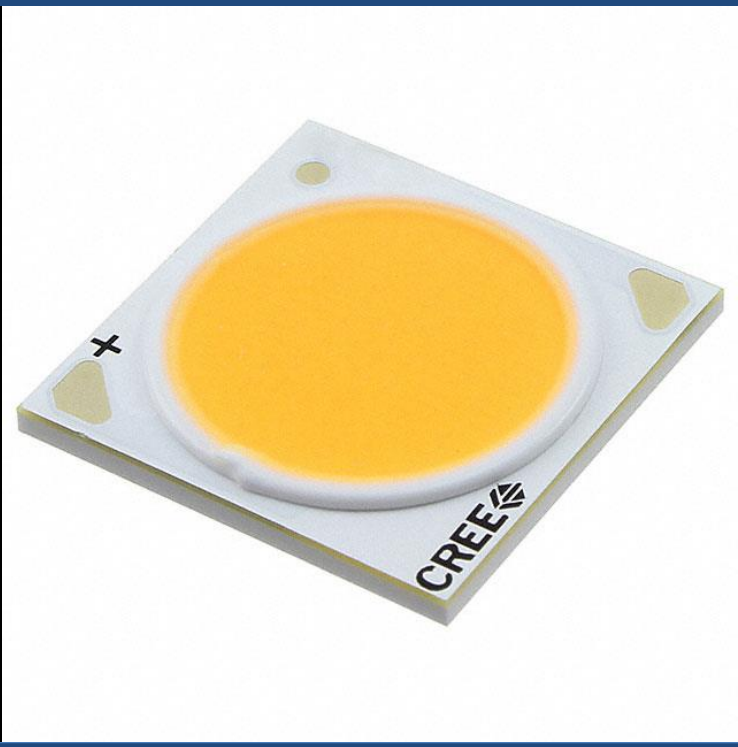
- Lumileds LUXEON 3535L (3900K)



Chip On Board LED

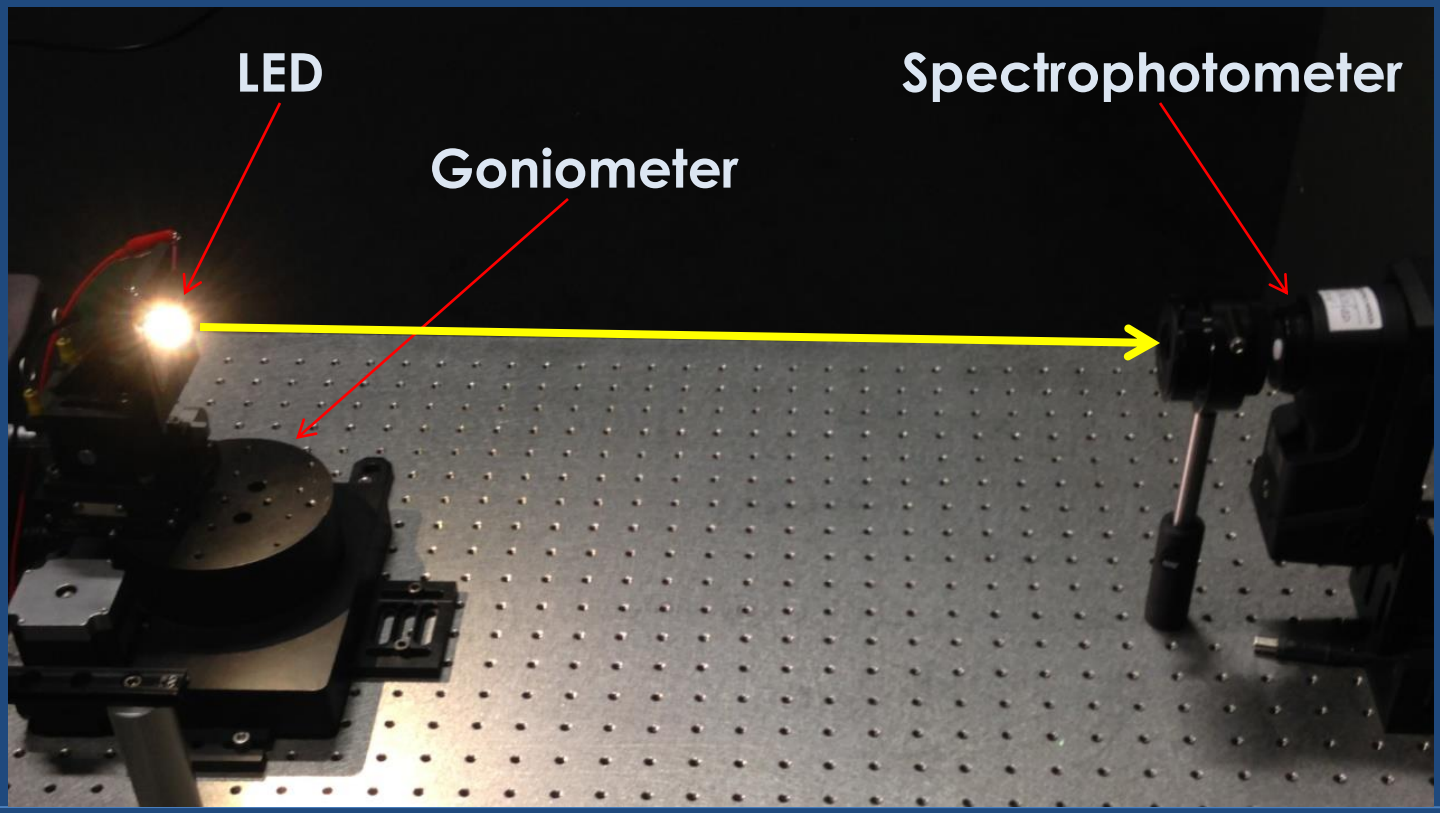
- Cree CXB-1830 (3000K)





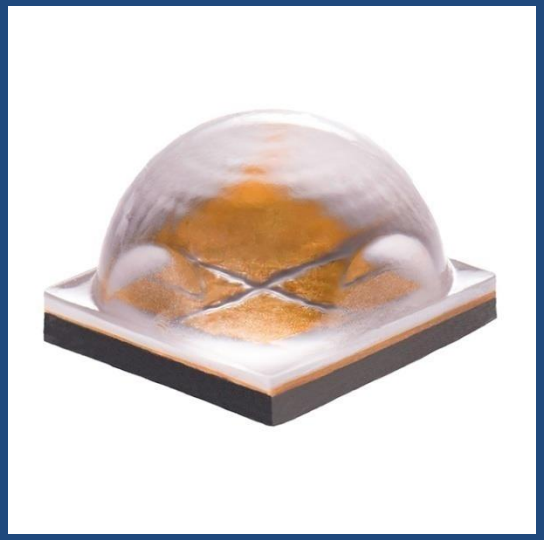
Measurement

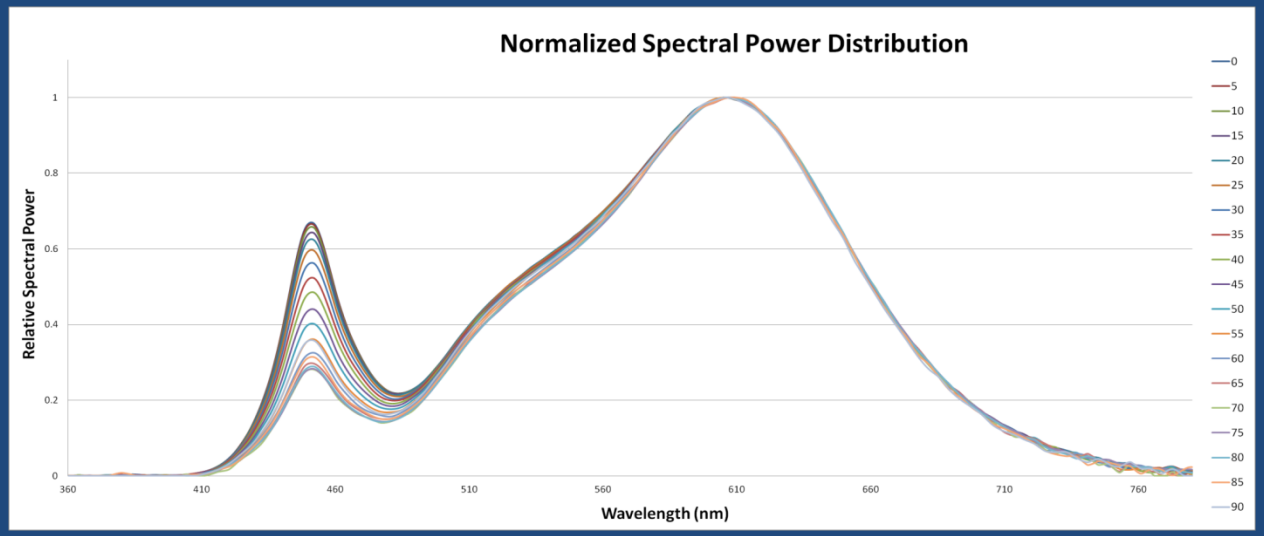
- Color as a Function of Angle



Measurement

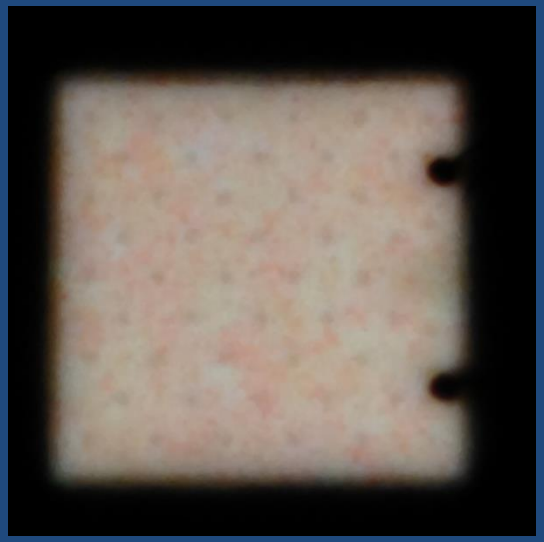
- High Power LED

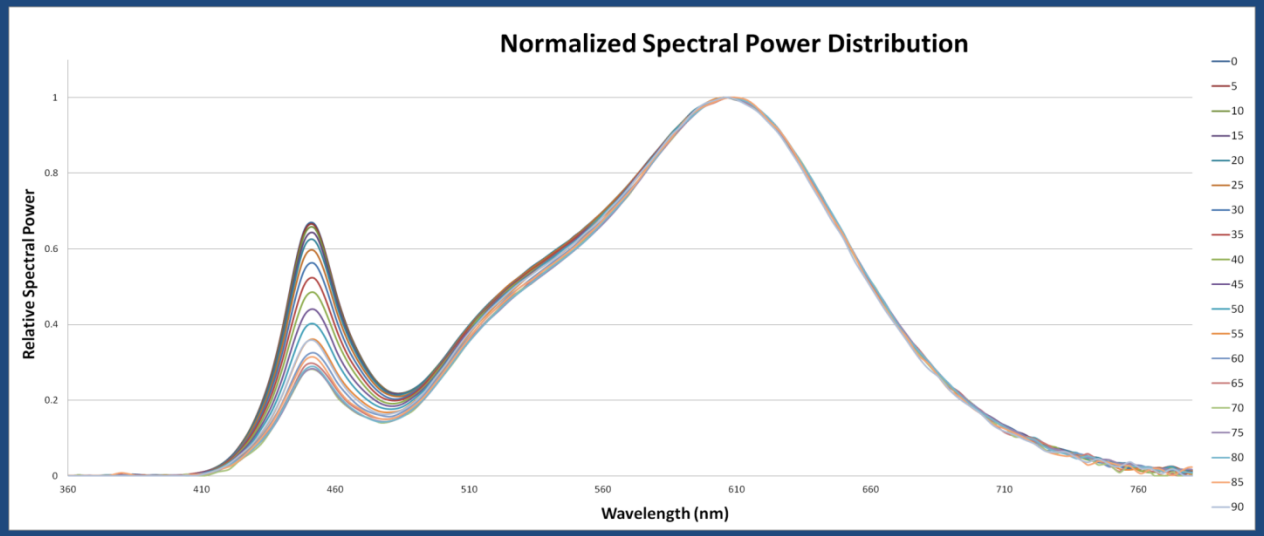




Modeling

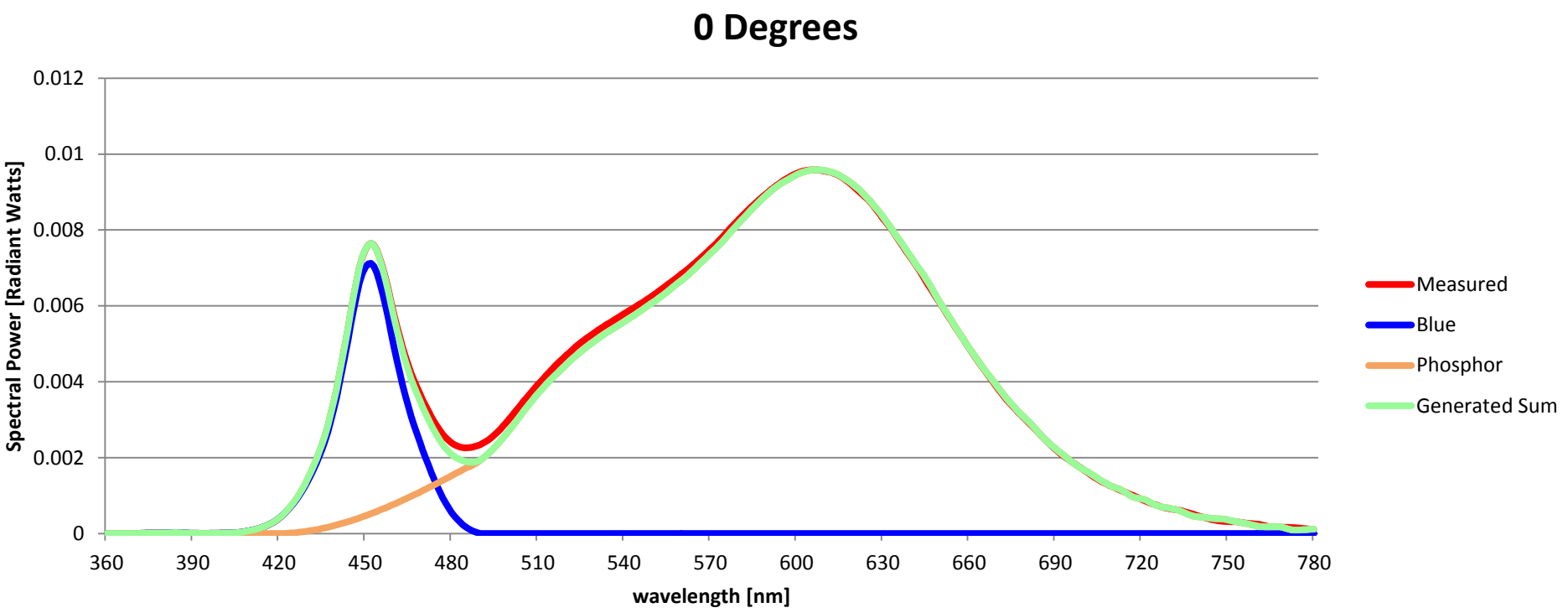
- High Power LED





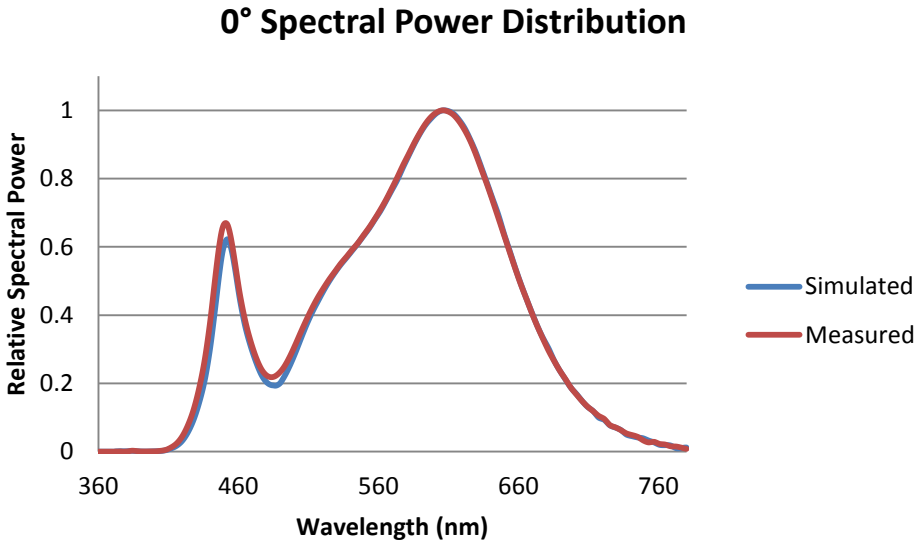
Modeling

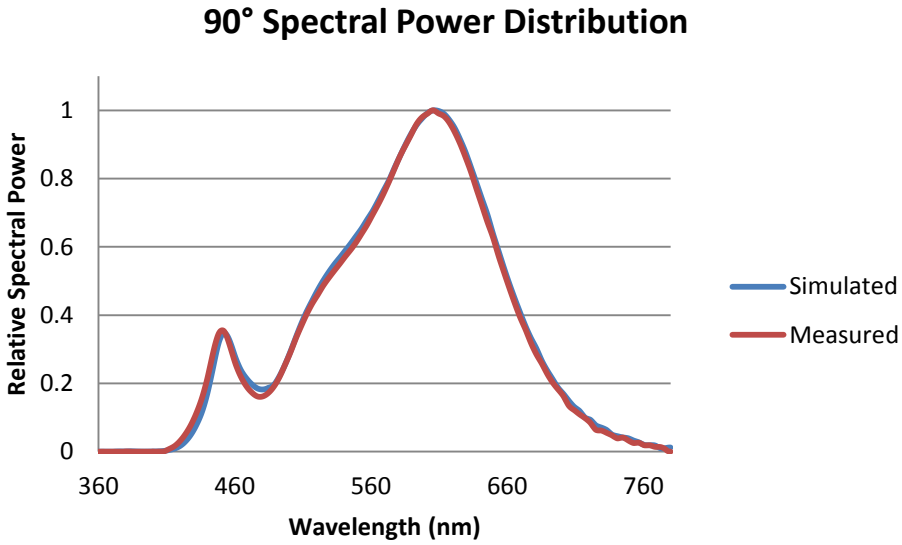
- High Power LED



Verification

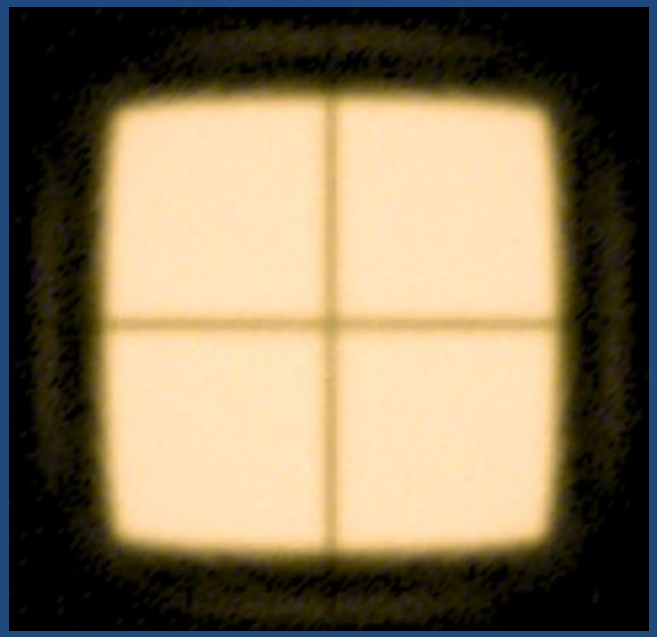
- High Power LED





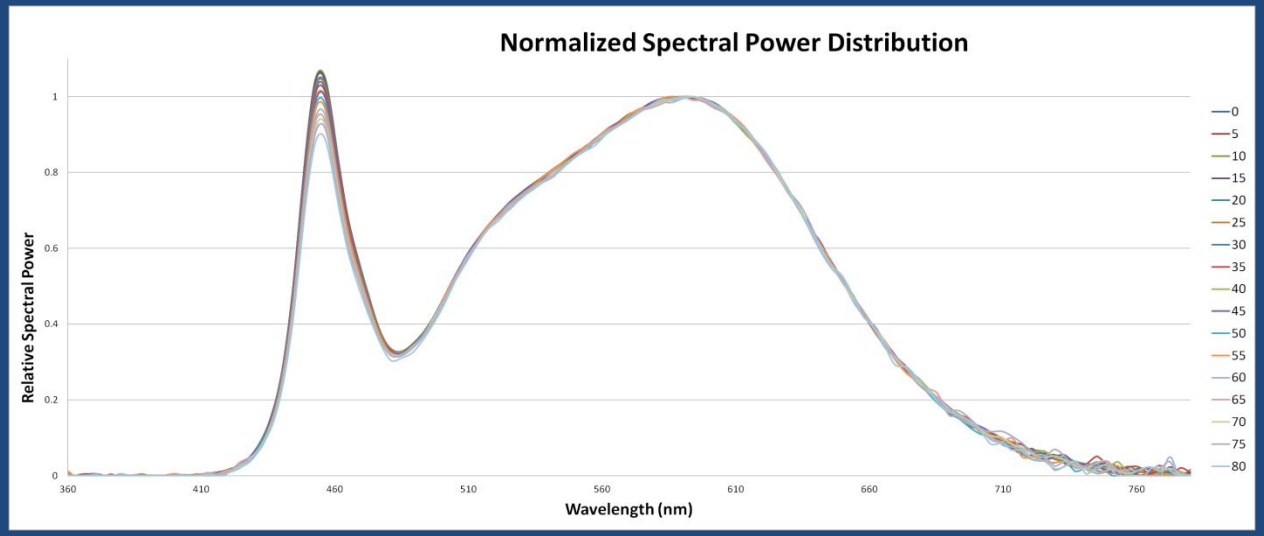
Verification

- High Power LED



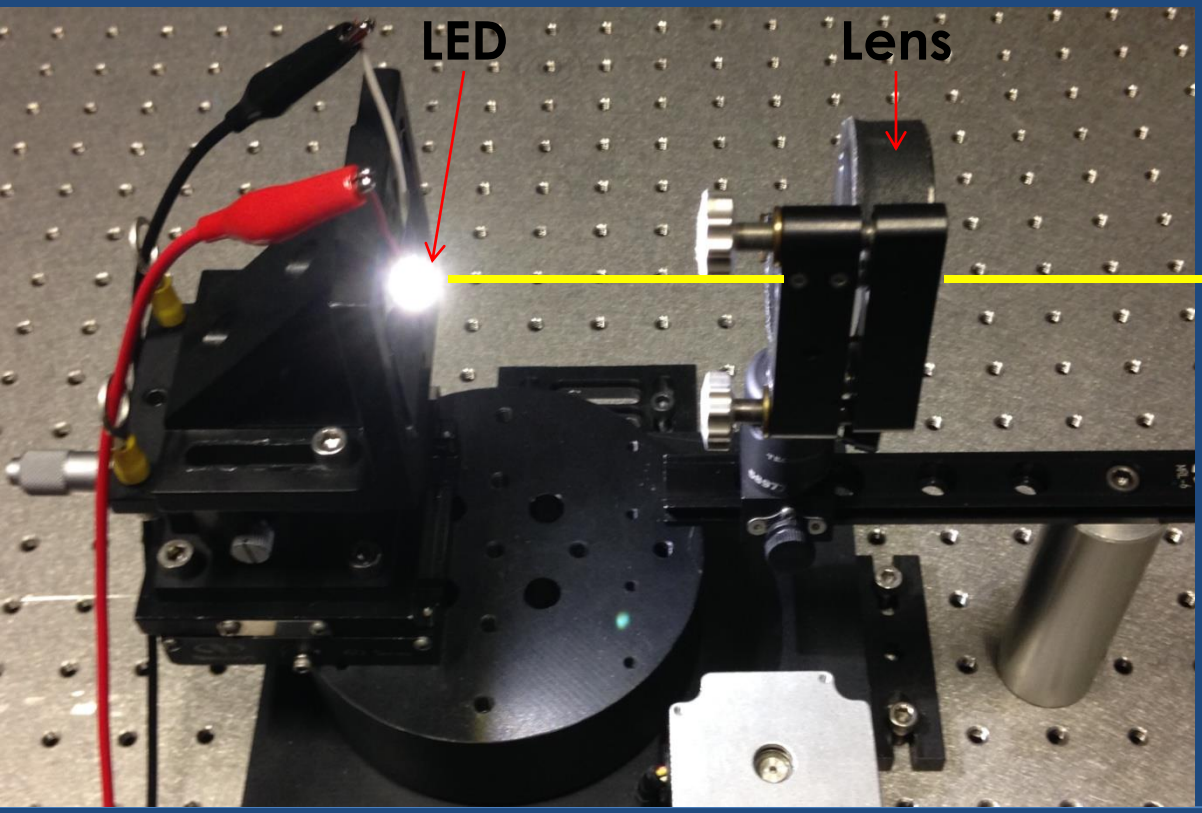
Measurement

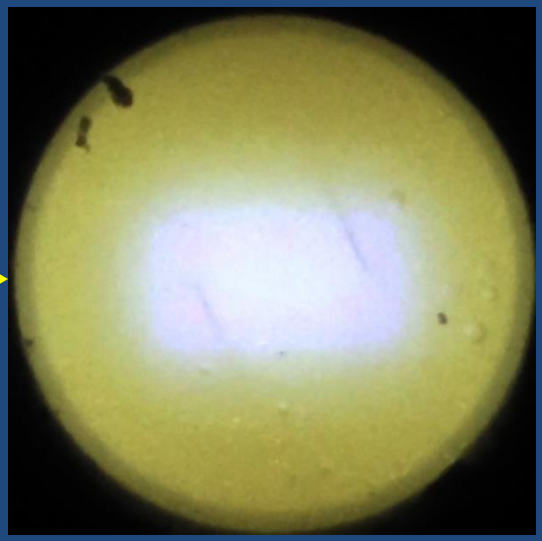
- Mid Power LED



Measurement

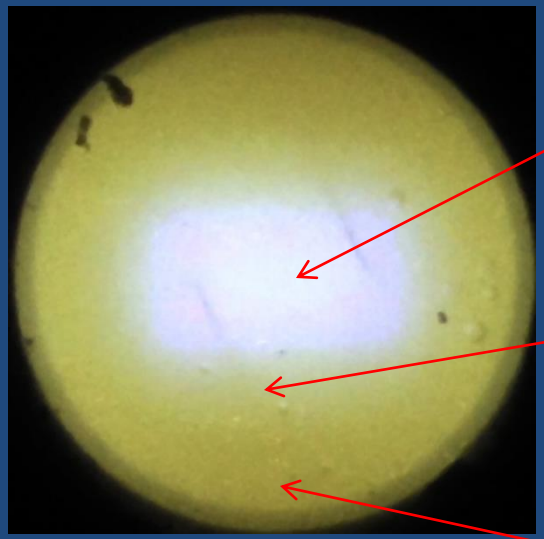
- Color as a Function of Area

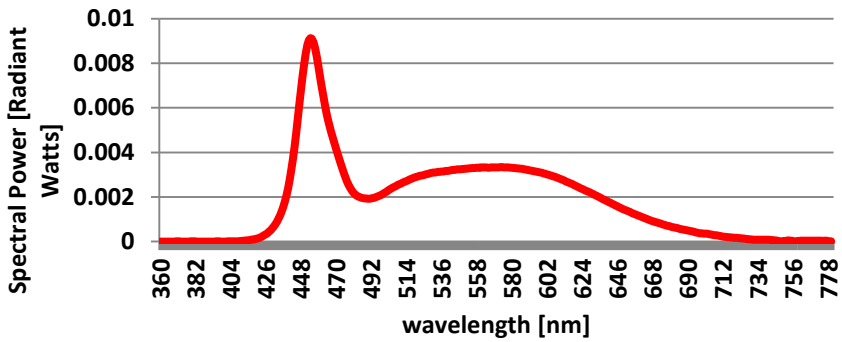


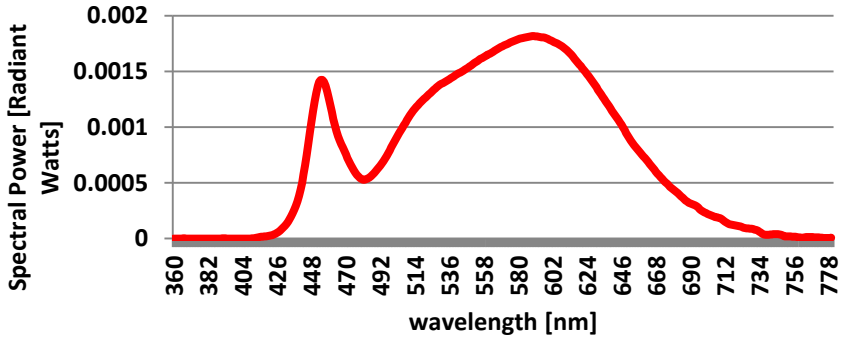


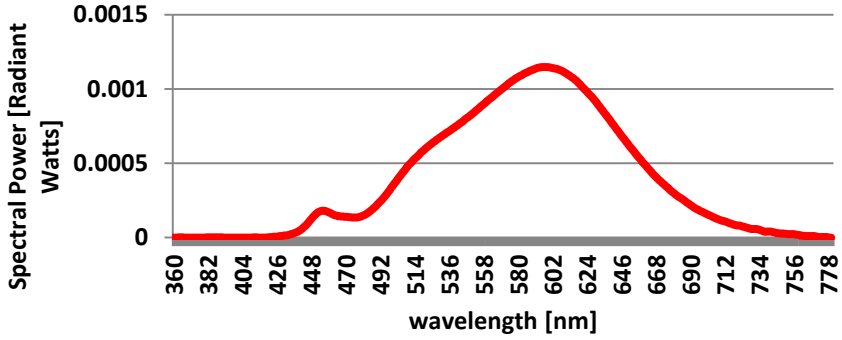
Modeling

- Mid Power LED



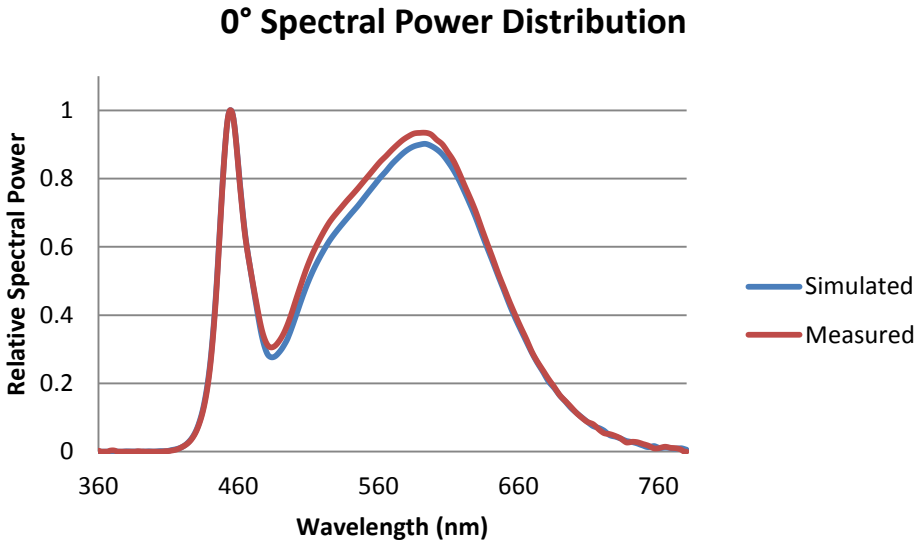


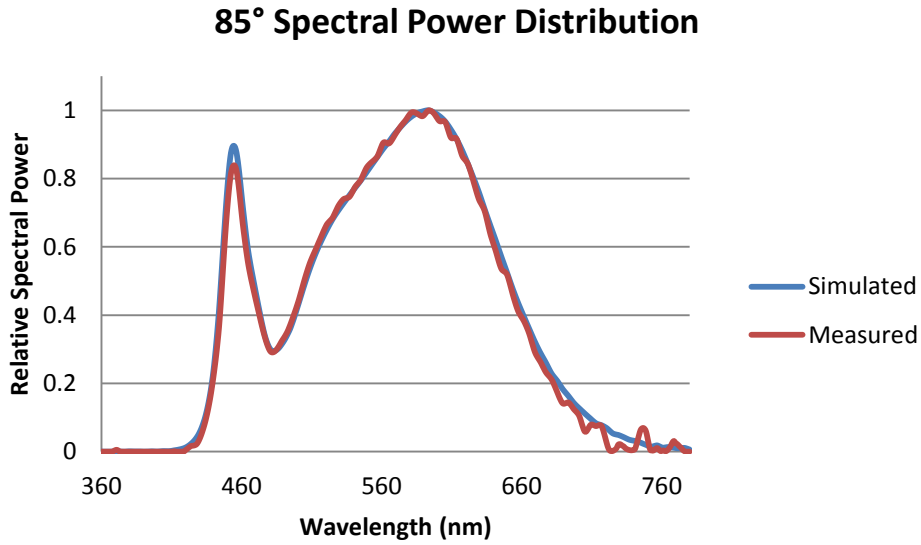




Verification

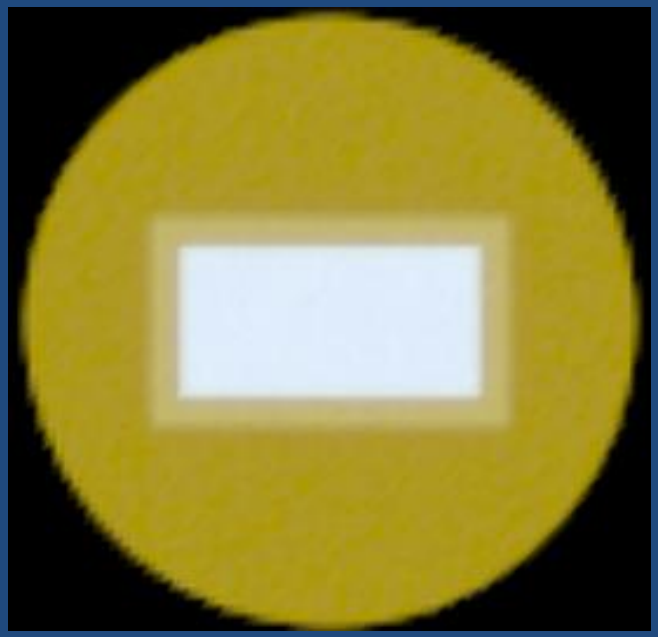
- Mid Power LED

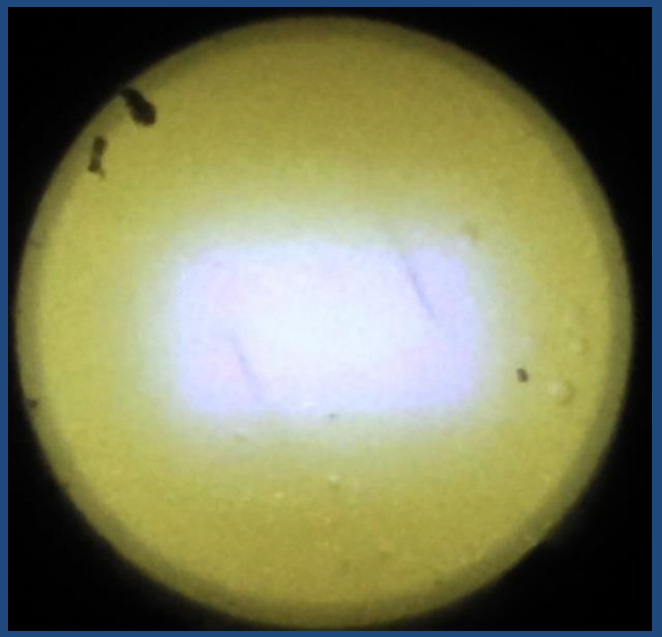




Verification

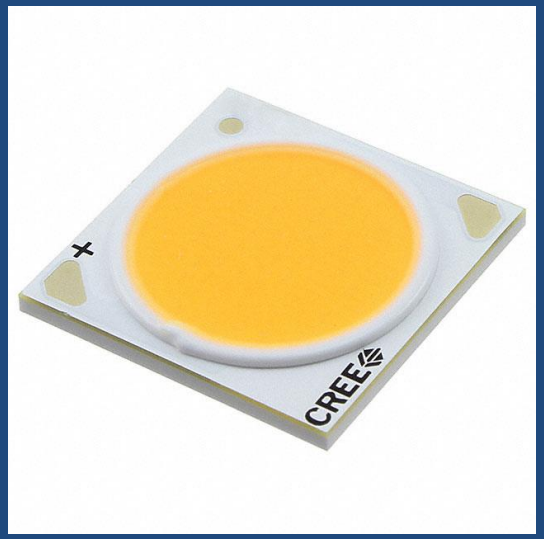
- Mid Power LED

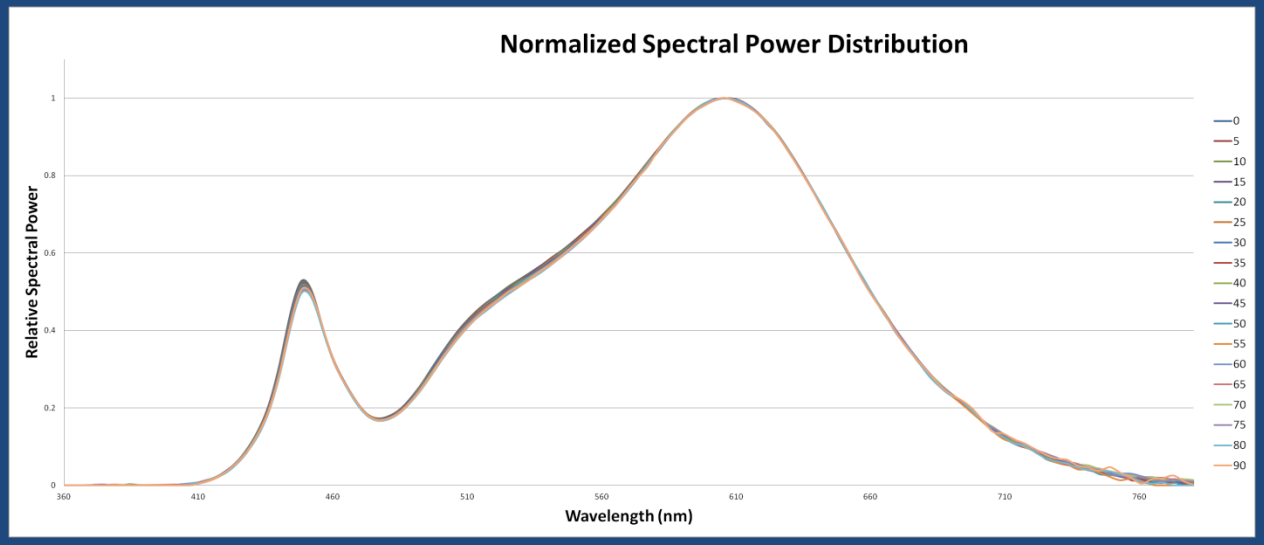




Measurement

- Chip On Board LED

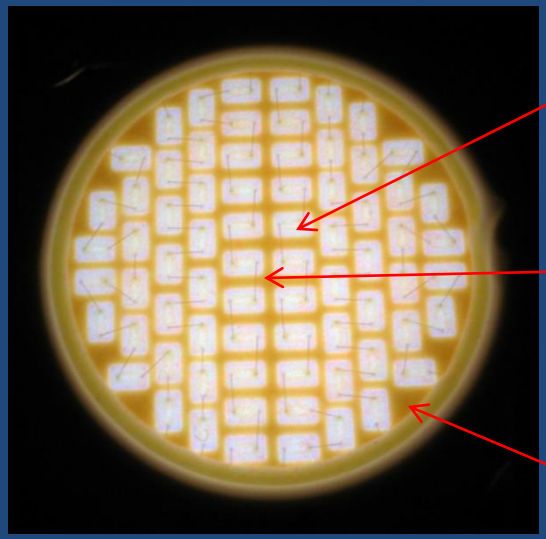


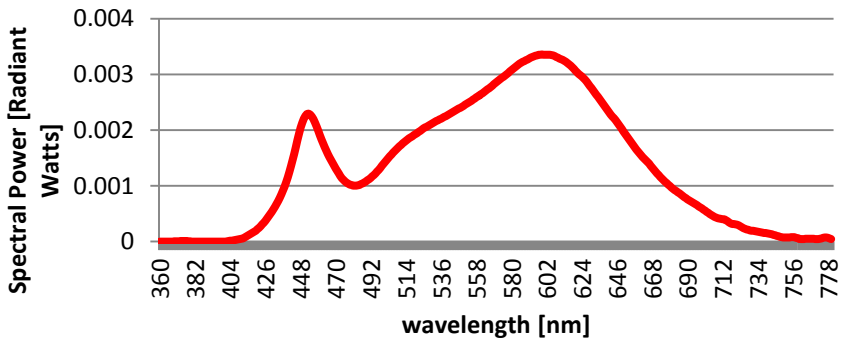


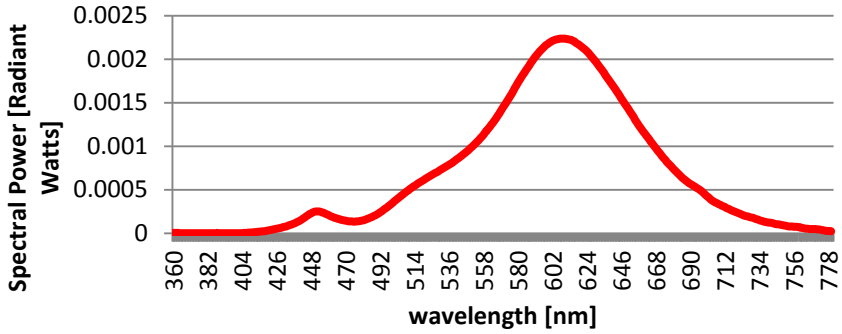
Itioptics

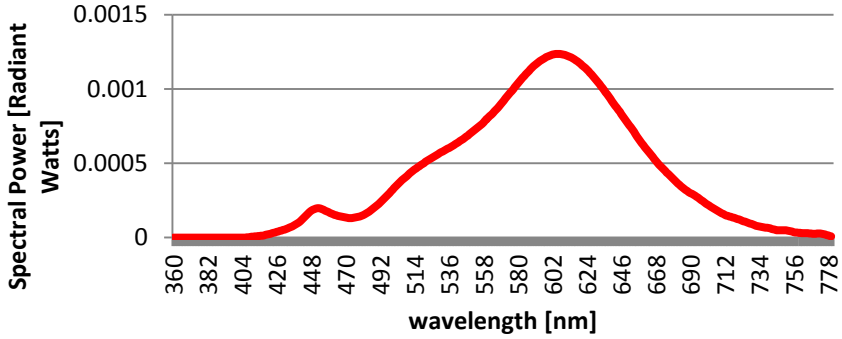
Modeling

- Chip On Board LED



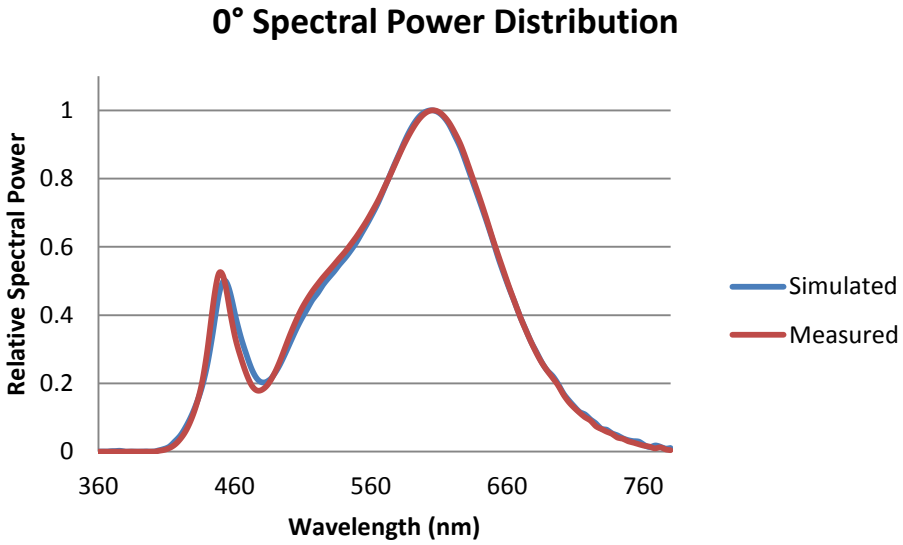


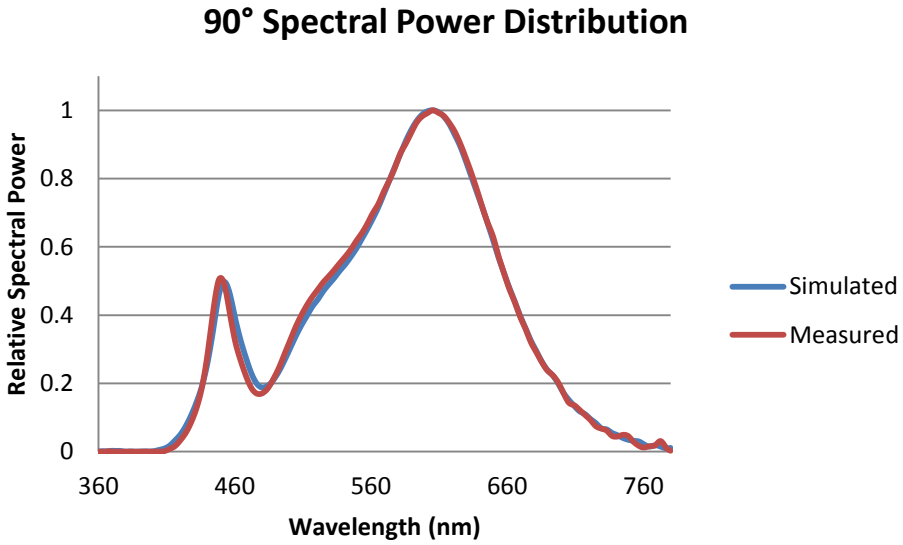




Verification

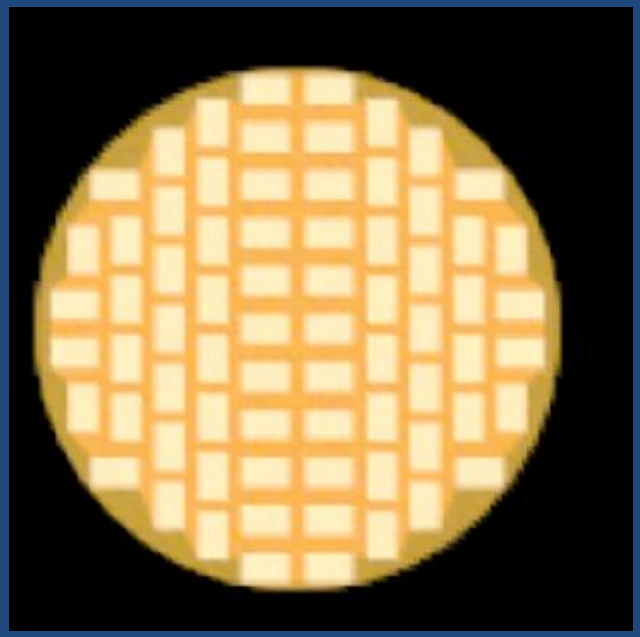
- Chip On Board LED

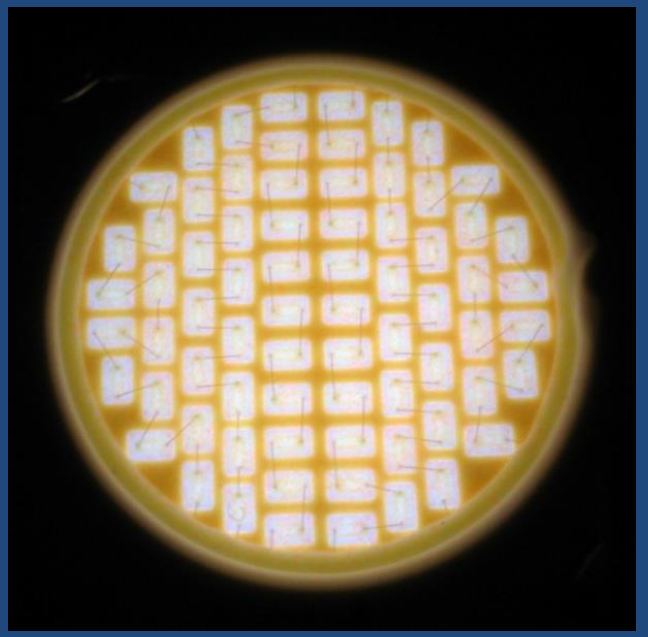




Verification

- Chip On Board LED





Future Potential

- Photon Phosphor Interaction
- Volumetric Scattering
- Smooth Spectral Gradients
- Spectral Material Properties
- Spectral Variation of LED Binning